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(71)Applicant :

KAWASUMI LAB INC

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(72)Inventor :

HARATAKE KAZUE

OMORI YUJI

WATANABE YUKA

UCHIYAMA YASUJIRO

HATANO TAKATOMO

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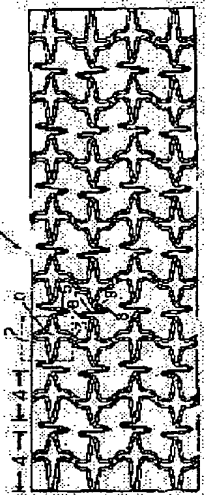
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(54) STENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a stent wherein damage to a blood vessel caused by flare phenomenon when it meanders in the blood vessel can be suppressed as little as possible and resistance when clipping to a balloon is performed can be decreased.

SOLUTION: In a stent 1 formed into an approximately cylindrical body and stretchable in the radial direction from the inside of the cylindrical body, an annular unit 4 is constituted in such a way that constituent elements 2 respectively constituted by connecting four pieces of approximately wave-like constituent elements 6 (6A) with each other up and down and left and right around a point O as a center are connected with other constituent elements 2 up and down through connecting parts 3 and arranging a plurality of them so as to surround the central axis of the stent 1, and a plurality of the annular units 4 are extended in the axial direction of the stent and the annular units 4 are connected with each other at one or more positions each with a connecting part 5 consisting of an approximately straight line part 7 and bending parts 8.



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CLAIMS

[Claim(s)]

- [Claim 1] It is the stent 1 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 4 is constituted by arranging more than one so that other components 2 may be connected for the component 2 constituted by connecting four abbreviation wave-like components 6 (6A) vertically and horizontally focusing on Point O up and down through a connection 3 and the medial axis of the stent 1 may be surrounded. It is the stent 1 which said two or more annular units 4 are installed by the shaft orientations of the stent 1, and is characterized by said annular unit 4 comrades being connected by the connection section 5 which at least one place becomes from the abbreviation bay 7 and a flection 8.
- [Claim 2] said connection section 5 — the both sides of the central abbreviation bay 7 (7L) — the two flection 8 (8U) — It is the stent 1 according to claim 1 characterized by being constituted by connecting other abbreviation bays 7 (7S) through 8L, respectively, and connecting the edge of other abbreviation bays 7 (7S) with the edge of said component 6 which constitutes an annular unit 4 which is different through a connection 9, respectively.
- [Claim 3] They are claim 1 which component 6A of the upper and lower sides of said component 2 is incurvated the right or leftward to the shaft orientations of the stent, and is characterized by forming said incurvated abbreviation wave-like component 6A in the vertical symmetry to the stent radial center line C2 of a component 2 thru/or the stent 1 according to claim 2.
- [Claim 4] The component 2 which has component 6A of said upper and lower sides is claim 1 characterized by having arranged in the stent radius 4 direction so that the curve direction of component 6A of said upper and lower sides may serve as right-and-left alternation alternately [of each component 2] thru/or the stent 1 according to claim 3.
- [Claim 5] Claim 1 characterized by forming the thickness of said flection 8 more thinly than other configuration members of the stent thru/or stent 1 according to claim 4.
- [Claim 6] Said connection section 5 is claim 1 characterized by being arranged the stent radial so that the location of two flections 8 (8U, 8L) may serve as right-and-left alternation alternately [of the connection section 5] thru/or the stent 1 according to claim 5.
- [Claim 7] It is the stent 21 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 24 is constituted by arranging more than one so that said other components 26 may be connected up and down through the connection 23 of the component 26 of the shape of a curve which has two or more flection 26A which consists of an abbreviation bay 27 and a flection 28 up and down and the medial axis of the stent 21 may be surrounded. It is the stent 21 which said two or more annular units 24 are installed by the shaft orientations of the stent 21, and is characterized by said annular unit 24 comrades being connected by the connection section 25 in which it has flection 25A more than a piece at least.
- [Claim 8] The edge of said connection section 25 is the stent 21 according to claim 7 characterized by connecting with the edge of said component 26 which constitutes an annular unit 24 which is different through a connection 29, respectively.
- [Claim 9] Claim 7 characterized by forming more thickly than the width of face of said connection section 25 the component 26 of the shape of said curve, and the width of face of a connection 23 thru/or stent 21 according to claim 8.
- [Claim 10] Said connection section 25 is claim 7 which shortens die length extended to the shaft orientations of the stent rather than the die length extended to radial [of the stent] at the time of the escape of the stent, and is characterized by forming so that the shaft orientations of the stent may be approached at a straight line thru/or the stent 21 according to claim 9.
- [Claim 11] The component 26 of the shape of said curve is claim 7 which makes [more] the number of the shaft orientations of the stent than the number of radial [of the stent], and is characterized by having arranged the connection section 25 of a component 26 a component 26 and by turns per two pieces to radial [of the stent] thru/or the stent 21 according to claim 10.
- [Claim 12] Claim 7 characterized by forming in at least 0.3mm or more the spacing D of connection section 25 comrades which constitute said two-piece unit thru/or stent 21 according to claim 11.
- [Claim 13] It is the stent 41 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The component 42 constituted by connecting four abbreviation wave-like components 46 with the upper right, the lower right, the upper left, and the lower left focusing on Point O up and down The annular unit 44 is constituted by arranging more than one so that other components 42 may be connected up and down through the connection 43 constituted by connecting abbreviation bay 43B with the upper right, the lower right, the upper left, and the lower left of abbreviation wave section 43C and the medial axis of the stent 41 may be surrounded. Said two or more annular units 44 are installed by the shaft orientations of the stent 41. Said annular unit 44 comrades The upper right of abbreviation wave section 45C, Stent 41 characterized by being connected by at least one or more connection sections 45 constituted by connecting abbreviation bay 45B with the lower right, the upper left, and the lower left.
- [Claim 14] Said abbreviation wave-like component 46 is the stent 41 according to claim 13 characterized by forming in the vertical symmetry to the center line C2 of bilateral symmetry and the stent shaft orientations of a component 42 to the stent radial center line C1 of a component 42.
- [Claim 15] For bilateral symmetry and the connection section 45, said connection 43 is claim 13 characterized by forming in bilateral symmetry to the stent radial center line C4 of the connection section 45 thru/or the stent 41 according to claim 14 to the stent radial center line C3 of a connection 43.
- [Claim 16] The abbreviation wave-like component 46 is claim 13 characterized by being formed in the space divided between Point O, said center line C1, and said center line C2 thru/or the stent 41 according to claim 15.
- [Claim 17] It is the stent 61 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. Other components 62 are connected up and down through the connection 63 of the component 62 constituted by connecting four abbreviation wave-like components 66 with the upper right, the lower right, the upper left, and the lower left focusing on Point O which consists of abbreviation bay for two 63A up and down. The annular unit 64 is constituted by arranging more than one so that the medial axis of

the stent 61 may be surrounded. It is the stent 61 which said two or more annular units 64 are installed by the shaft orientations of the stent 61, and is characterized by said annular unit 64 comrades being connected by the connection section 65 which at least one place becomes from abbreviation bay 65B and flexion 65A.

[Claim 18] Said abbreviation wave-like component 66 is the stent 61 according to claim 17 characterized by being formed in the vertical symmetry to the center line C2 of bilateral symmetry and the stent die-length direction of a component 62 to the stent radial center line C1 of a component 62.

[Claim 19] Said connection section 65 is claim 17 which is constituted by connecting other flexion 65A and abbreviation bay 65B to the both sides of central flexion 65A through abbreviation bay 65B, respectively, and is characterized by connecting the edge of other abbreviation bay 65B with said connection 63 thru/or the stent 61 according to claim 18.

[Claim 20] Said connection section 65 is claim 17 characterized by being formed in bilateral symmetry to the stent radial center line C3 of the connection section 65 thru/or the stent 61 according to claim 19.

[Claim 21] To the both ends of the shaft orientations of the stent 61, by [of 66C] connecting abbreviation wave-like component 66B up and down Annular unit 64A is constituted by arranging more than one so that other component 62A may be connected for component 62A constituted through connection 63B up and down and the medial axis of the stent 61 may be surrounded. Claim 17 characterized by connecting annular unit 64A to the annular unit 64 through the connection section 65 thru/or stent 61 according to claim 20.

[Claim 22] Claim 17 characterized by connecting abbreviation bay 65B and said connection 63B of the connection section 65 thru/or stent 61 according to claim 21.

[Claim 23] It is the stent 81 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 84 is constituted by [of the component 86 of the letter of the abbreviation for S characters which has two or more flexion 86A] arranging more than one so that said other components 86 may be connected up and down through a connection 83 and the medial axis of the stent 81 may be surrounded. It is the stent 81 to which said two or more annular units 84 are installed by the shaft orientations of the stent 81, and said annular unit 84 comrades are characterized by at least one place being connected by the curve-like connection section 85.

[Claim 24] Said connection section 85 is the stent 81 according to claim 23 characterized by setting the tooth space S for every piece to the stent radial, and being formed in it.

[Claim 25] Said component 86 is claim 23 characterized by being constituted by connecting large loop-formation section 86E with minor loop section 86D which consists of flexion 86A and curvilinear section 86B through central curvilinear section 86B thru/or the stent 81 according to claim 24.

[Claim 26] They are claim 23 characterized by connecting the end of said connection section 85 to the edge of curvilinear section 86B of minor loop section 86D of a component 86, and connecting the end of another side of the connection section 85 to curvilinear section 86B of large loop-formation section 86E of a component 86 thru/or the stent 81 according to claim 25.

[Claim 27] Claim 23 characterized by having connected with the both ends of the shaft orientations of the stent 81 the component 96 of the letter of the abbreviation for S characters which has short curvilinear section 96C up and down through the connection 93, having constituted annular unit 84A by arranging more than one so that the medial axis of the stent 81 might be surrounded, and connecting annular unit 84A to the annular unit 84 through the connection section 85 thru/or stent 81 according to claim 26.

[Claim 28] Said component 96 is claim 23 characterized by being constituted by connecting abbreviation wave section 96D which consists of large loop-formation section 96E and flexion 96A which consist of flexion 96A and curvilinear section 96B, and short curvilinear section 96C through central curvilinear section 96B thru/or the stent 81 according to claim 27.

[Claim 29] Large loop-formation section 96E of said component 96 is claim 23 characterized by being arranged abbreviation wave section 96D and by turns radial [of the stent], and being arranged so that flexion 96A of large loop-formation section 96E may be located in the both ends of the shaft orientations of the stent thru/or the stent 81 according to claim 28.

[Claim 30] The connection 83 of said component 86 is claim 23 characterized by setting the tooth space S for every piece to radial [of the stent], and being formed in it thru/or according to claim 29 stent 81A.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to amelioration of the stent used for the improvement of the narrow segment produced in the living body, such as a blood vessel.

[0002]

[Description of the Prior Art] Drawing 18 to drawing 21 is the top view of the stent 201, 221, 241, and 261 used now (before an escape and for (B), after an escape and drawing 21 are [(A)] a top view before an escape at drawing 18 to drawing 20). There was the next technical problem in each stent 201, 221, 241, and 261. Since the stent 201 of drawing 18 is inserted drawing a curve in the part at which the blood vessel turned in the part of (a) A at the time of a delivery since bend 206A of the component 206 which constitutes the annular unit 204 counters near space 206B of the component 206 which constitutes other annular units 204 and is arranged, its possibility that some components 206 will serve as projection connection is high. (b) It is weak a little to the force applied to radial (it is easy to carry out the restenosis). Since the stent 221 of drawing 19 is inserted drawing a curve in the part at which the blood vessel turned in the part of (a) B at the time of a delivery since bend 226A of the component 226 which constitutes each annular unit 224 counters mutually and is arranged by stent 221 shaft orientations at the single tier, its possibility that some components 226 will serve as projection connection is high. (b) It is weak a little to the force applied to radial (it is easy to carry out the restenosis). (c) Since the connection section 225 is arranged asymmetrically stent 221 shaft orientations and radial, it is easy to produce torsion at the time of an escape. (d) As an escape is large, a stent overall length becomes shorter. Since the area of each of the components 246 which constitute the annular unit 244 is small and the die length of the connection section 245 also has it, the stent 241 of drawing 20 lacks in (a) flexibility. [short] (b) The required pressure applied to a balloon catheter becomes large in the case of an escape. (c) As an escape is large, a stent overall length becomes shorter. In case clipping of the stent is carried out to a balloon catheter, the $\phi 1.5\text{mm}$ stent will be contracted to about $\phi 0.85\text{mm}$, but since bend 266A of a component 266 and bend 265A of the connection section 265 which constitute the annular unit 264 approach, and are arranged, and the part of D has narrow spacing, the stent 261 of drawing 21 will lap. For this reason, unlike original physical properties, blood vessel wall damage and a flare phenomenon become easy to happen. Then, this invention persons reached the next invention, as a result of repeating examination wholeheartedly, in order to solve the above technical problem.

[0003]

[Means for Solving the Problem] [1] This invention is the stent 1 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 4 is constituted by arranging more than one so that other components 2 may be connected for the component 2 constituted by connecting four abbreviation wave-like components 6 (6A) vertically and horizontally focusing on Point O up and down through a connection 3 and the medial axis of the stent 1 may be surrounded. Said two or more annular units 4 are installed by the shaft orientations of the stent 1, and said annular unit 4 comrades offer the stent 1 connected by the connection section 5 which at least one place becomes from the abbreviation bay 7 and a flection 8.

[2] this invention — said connection section 5 — the both sides of the central abbreviation bay 7 (7L) — the two flection 8 (8U —) It is constituted by connecting other abbreviation bays 7 (7S) through 8L, respectively, and the edge of other abbreviation bays 7 (7S) provides with the stent 1 of a publication [1] connected with the edge of said component 6 which constitutes an annular unit 4 which is different through a connection 9, respectively.

[3] This invention incurvates component 6A of the upper and lower sides of said component 2 the right or leftward to the shaft orientations of the stent, and said incurvated abbreviation wave-like component 6A provides with the stent 1 of a publication [1] currently formed in the vertical symmetry to the stent radial center line C2 of a component 2 thru/or [2].

[4] The component 2 with which this invention has component 6A of said upper and lower sides provides with the stent 1 of a publication [1] arranged in the stent radius 4 direction so that the curve direction of component 6A of said upper and lower sides may serve as right-and-left alternation alternately [of each component 2] thru/or [3].

[5] This invention provides with the stent 1 of a publication [1] which formed the thickness of said flection 8 more thinly than other configuration members of the stent thru/or [4].

[6] As for this invention, the location of two flections 8 (8U, 8L) provides with the stent 1 of a publication [1] arranged the stent radial so that it may become right-and-left alternation alternately [of the connection section 5] thru/or [5], as for said connection section 5.

[7] This invention is the stent 21 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 24 is constituted by arranging more than one so that said other components 26 may be connected up and down through the connection 23 of the component 26 of the shape of a curve which has two or more flection 26A which consists of an abbreviation bay 27 and a flection 28 up and down and the medial axis of the stent 21 may be surrounded. Said two or more annular units 24 are installed by the shaft orientations of the stent 21, and said annular unit 24 comrades offer the stent 21 connected by the connection section 25 which has flection 25A more than a piece at least.

[8] This invention provides with the stent 21 of a publication [7] connected with the edge of said component 26 which constitutes the annular unit 24 from which the edge of said connection section 25 differs through a connection 29, respectively.

[9] This invention provides with the stent 21 of a publication [7] which formed more thickly than the width of face of said connection section 25 the component 26 of the shape of said curve, and the width of face of a connection 23 thru/or [8].

[10] This invention shortens die length extended to the shaft orientations of the stent rather than the die length to which said connection section 25 is extended to radial [of the stent] at the time of the escape of the stent, and provide with the stent 21 of a publication [7] formed so that the shaft orientations of the stent might be approached at a straight line thru/or [9].

[11] The component 26 of the shape of said curve makes [more] the number of the shaft orientations of the stent than the number of radial

[of the stent], and this invention provides with the stent 21 of a publication [7] which has arranged the connection section 25 of a component 26 a component 26 and by turns per two pieces to radial [of the stent] thru/or [10].

[12] This invention provides with the stent 21 of a publication [7] which formed in at least 0.3mm or more the spacing D of connection section 25 comrades which constitute said two-piece unit thru/or [11].

[13] This invention is the stent 41 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The component 42 constituted by connecting four abbreviation wave-like components 46 with the upper right, the lower right, the upper left, and the lower left focusing on Point O up and down The annular unit 44 is constituted by arranging more than one so that other components 42 may be connected up and down through the connection 43 constituted by connecting abbreviation bay 43B with the upper right, the lower right, the upper left, and the lower left of abbreviation wave section 43C and the medial axis of the stent 41 may be surrounded. Said two or more annular units 44 are installed by the shaft orientations of the stent 41. Said annular unit 44 comrades The upper right of abbreviation wave section 45C, The stent 41 connected by at least one or more connection sections 45 constituted by connecting abbreviation bay 45B with the lower right, the upper left, and the lower left is offered.

[14] This invention provides with the stent 41 of a publication [13] which formed said abbreviation wave-like component 46 in the vertical symmetry to the center line C2 of bilateral symmetry and the stent shaft orientations of a component 42 to the stent radial center line C1 of a component 42.

[15] In this invention, said connection 43 provides with the stent 41 of a publication [13] which formed bilateral symmetry and the connection section 45 in bilateral symmetry to the stent radial center line C4 of the connection section 45 thru/or [14] to the stent radial center line C3 of a connection 43.

[16] This invention provides with the stent 41 of a publication [13] currently formed in the space into which the abbreviation wave-like component 46 is divided between Point O, said center line C1, and said center line C2 thru/or [15].

[17] This invention is the stent 61 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. Other components 62 are connected up and down through the connection 63 of the component 62 constituted by connecting four abbreviation wave-like components 66 with the upper right, the lower right, the upper left, and the lower left focusing on Point O which consists of abbreviation bay for two 63A up and down. The annular unit 64 is constituted by arranging more than one so that the medial axis of the stent 61 may be surrounded. Said two or more annular units 64 are installed by the shaft orientations of the stent 61, and said annular unit 64 comrades offer the stent 61 connected by the connection section 65 which at least one place becomes from abbreviation bay 65B and flection 65A.

[18] This invention provides with the stent 61 of a publication [17] by which said abbreviation wave-like component 66 is formed in the vertical symmetry to the center line C2 of bilateral symmetry and the stent die-length direction of a component 62 to the stent radial center line C1 of a component 62.

[19] This invention is constituted when said connection section 65 connects other flection 65A and abbreviation bay 65B to the both sides of central flection 65A through abbreviation bay 65B, respectively, and the edge of other abbreviation bay 65B provides with the stent 61 of a publication [17] connected with said connection 63 thru/or [18].

[20] This invention provides with the stent 61 of a publication [17] by which said connection section 65 is formed in bilateral symmetry to the stent radial center line C3 of the connection section 65 thru/or [19].

[21] This invention To the both ends of the shaft orientations of the stent 61, by [of 66C] connecting abbreviation wave-like component 66B up and down Annular unit 64A is constituted by arranging more than one so that other component 62A may be connected for component 62A constituted through connection 63B up and down and the medial axis of the stent 61 may be surrounded. [17] which connected annular unit 64A to the annular unit 64 through the connection section 65 thru/or [20] are provided with the stent 61 of a publication.

[22] This invention provides with the stent 61 of a publication [17] which connected abbreviation bay 65B and said connection 63B of the connection section 65 thru/or [21].

[23] This invention is the stent 81 which it is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 84 is constituted by [of the component 86 of the letter of the abbreviation for S characters which has two or more flection 86A] arranging more than one so that said other components 86 may be connected up and down through a connection 83 and the medial axis of the stent 81 may be surrounded. Said two or more annular units 84 are installed by the shaft orientations of the stent 81, and said annular unit 84 comrades offer the stent 81 with which at least one place is connected by the curve-like connection section 85.

[24] This invention provides with the stent 81 of a publication [23] which said connection section 85 sets the tooth space S for every piece to the stent radial, and is formed.

[25] This invention provides with the stent 81 of a publication [23] constituted when said component 86 connected large loop-formation section 86E with minor loop section 86D which consists of flection 86A and curvilinear section 86B through central curvilinear section 86B thru/or [24].

[26] The end of said connection section 85 is connected to the edge of curvilinear section 86B of minor loop section 86D of a component 86 for this invention, and the end of another side of the connection section 85 provides with the stent 81 of a publication [23] connected to curvilinear section 86B of large loop-formation section 86E of a component 86 thru/or [25].

[27] This invention connects with the both ends of the shaft orientations of the stent 81 the component 96 of the letter of the abbreviation for S characters which has short curvilinear section 96C up and down through a connection 93, and it constitutes annular unit 84A by arranging more than one so that the medial axis of the stent 81 may be surrounded, and it provides with the stent 81 of a publication [23] characterized by connecting annular unit 84A to the annular unit 84 through the connection section 85 thru/or [26].

[28] This invention provides with the stent 81 of a publication [23] thru/or the claim [27] constituted when said component 96 connected abbreviation wave section 96D which consists of large loop-formation section 96E and flection 96A which consist of flection 96A and curvilinear section 96B, and short curvilinear section 96C through central curvilinear section 96B.

[29] Large loop-formation section 96E of said component 96 provides with the stent 81 of a publication [23] by which this invention is arranged abbreviation wave section 96D and by turns radial [of the stent], and it is arranged so that flection 96A of large loop-formation section 96E may be located in the both ends of the shaft orientations of the stent thru/or [28].

[30] This invention provides with stent 81A of a publication [23] which the connection 83 of said component 86 sets the tooth space S for every piece to radial [of the stent], and is formed thru/or [29].

[0004]

[Embodiment of the Invention] Drawing 1 is the top view (drawing 2 is the detail drawing of the component of drawing 1 , and drawing 3 is a top view after the escape of drawing 1) of the stent 1 of this invention. The stent 1 is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 4 is constituted by arranging more than one so that other components 2 may be connected for the component 2 constituted by connecting four abbreviation wave-like components 6 (6A) vertically and horizontally focusing on Point O up and down through a connection 3 and the medial axis of the stent 1 may be surrounded. Said two or more annular units

4 are installed by the shaft orientations of the stent 1, and said annular unit 4 comrades are connected by the connection section 5 which at least one place becomes from the abbreviation bay 7 and a flection 8.

[0005] Said connection section 5 is constituted by connecting other short abbreviation bay 7S to the both sides of central long abbreviation bay 7L through the two flection 8 (upward flection 8U and downward flection 8L), respectively, and other short edges of abbreviation bay 7S are connected with the edge of said component 6 which constitutes an annular unit 4 which is different through a connection 9, respectively. By forming the connection section 5 as mentioned above, the damage on the blood vessel by the flare phenomenon at the time of moving the inside of a blood vessel in a zigzag direction can be suppressed as much as possible. Moreover, if die-length 5L at the time of the escape of the connection section 5 is made by constituting a component 2 like drawing 3 with die-length 6L (for example, 1.45mm) of the component 6 on either side, FO shortening at the time of an escape can be prevented by setting up equally or for a long time (for example, 1.62mm).

[0006] The component 6 of right and left of said connection 2 is formed in asymmetry (for example, the left being long, and the right being short, or the right being long short [the left]) to the center line C1 of the stent shaft orientations of a component 2. Component 6A of the upper and lower sides of said component 2 incurvates the shaft orientations of the stent the right or leftward, and said incurvated abbreviation wave-like component 6A is formed in the vertical symmetry to the stent radial center line C2 of a component 2. Flexibility is securable by incurvating abbreviation wave-like component 6A. The component 6 on either side is located on the line of Point O and said center line C2, and up-and-down component 6A is located on the line of Point O and said center line C1. Although a component 6 and a connection 9 on either side are located on the line of Point O and said center line C2, an up-and-down component 6A edge and an up-and-down connection 3 are in the location shifted from the line of Point O and said center line C1. The component 2 which has component 6A of said upper and lower sides is arranged to the stent radial so that the curve direction of abbreviation wave-like component 6A of said upper and lower sides may serve as right-and-left alternation alternately [of each component 2].

[0007] The thickness of said flection 8 (upward flection 8U, downward flection 8L) is formed more thinly than other configuration members of the stent 1. The flexibility at the time of this being extended to the shaft orientations of the stent is securable. Said connection section 5 is arranged the stent radial so that the location of two flections 8 (upward flection 8U and downward flection 8L) may serve as right-and-left alternation alternately [of the connection section 5]. The resistance in the case of clipping is mitigable on balun by arranging by turns the connection section 5 which has the component 2 and two flections 8 (upward flection 8U, downward flection 8L) which have abbreviation wave-like component 6A as mentioned above to the stent radial.

[0008] Considering workability and the engine performance, the radial number of arrangement of a component 2 has eight good pieces from four pieces in the stent whose path after an escape four or more pieces are desirable in radial, for example, is 3.5mm in the stent 3mm or more as a path after an escape. In shaft orientations, it is good in the stent with a die length of 15mm for 12 pieces to arrange 15 pieces from ten pieces in the stent which is 20mm preferably from eight pieces.

[0009] Drawing 4 is the top view (drawing 5 is the detail drawing of the component of drawing 4 , and drawing 6 is a top view after the escape of drawing 4) of the stent 21 of this invention. The stent 21 is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 24 is constituted by arranging more than one so that said other components 26 may be connected up and down through the connection 23 of the component 26 of the shape of a curve which has two or more flection 26A which consists of an abbreviation bay 27 and a flection 28 up and down and the medial axis of the stent 1 may be surrounded. Said two or more annular units 24 are installed by the shaft orientations of the stent 21, and said annular unit 24 comrades are connected by the connection section 25 which has flection 25A more than a piece at least.

[0010] The connection section 25 forms upward flection 25A and downward flection 25A by turns, and in the connection section 25 of a vertical pair, it is formed so that the sense of flection 25A of the upper connection section 25 and flection 25A of the lower connection section 25 may become respectively opposite. The edge of said connection section 25 is connected with the edge of said component 26 which constitutes an annular unit 24 which is different through a connection 29, respectively. The component 26 of the shape of said curve and the width of face of the abbreviation bay 27 are formed more thickly than the width of face of said connection section 25. The force in which this is equal to compression from radial [of the stent] can be strengthened. Said connection section 25 shortens die length extended to the shaft orientations of the stent a little rather than the die length extended to radial [of the stent] at the time of the escape of the stent, and it forms it so that the shaft orientations of the stent may be approached at a straight line.

[0011] The component 26 of the shape of said curve made [more] the number of the shaft orientations of the stent than the number of radial [of the stent], and arranges the connection section 25 of a component 26 a component 26 and by turns per two pieces to radial [of the stent]. For this reason, it excels in the flexibility at the time of the delivery to a blood vessel. The spacing D of connection section 25 comrades which constitute said two-piece unit is formed in at least 0.3mm or more. For this reason, the lap part of the A sections can be prevented from the ability doing at the time of clipping to balun. Spacing D means spacing of the topmost part U and Bottom L, as shown in each drawing 2 . A connection 23 forms rightward flection 28R and leftward flection 28L in the both ends of long abbreviation bay 27L, short abbreviation bay 27S are further formed in these both ends, and still shorter abbreviation bay 27S are connected with the component 26 through the connection 29 at the connection section 25.

[0012] The connection section 35 which consists of the curvilinear section 36 and an abbreviation bay 37 is arranged a component 26 and by turns stent 21 radial one, and annular unit 24A of the both ends of the stent 21 is formed so that the abbreviation bay 37 may be located in the edge of stent 21 shaft orientations. Considering workability and the engine performance, the radial number of arrangement of a component 26 has eight good pieces from six pieces in the stent whose path after an escape four or more pieces are desirable in radial, for example, is 4.0mm in the stent 3.0mm or more as a path after an escape. In shaft orientations, it is good in the stent with a die length of 15mm for 18 pieces to arrange 36 pieces from 28 pieces in the stent which is 30mm preferably from 14 pieces.

[0013] Drawing 7 is the top view (drawing 8 is the detail drawing of the component of drawing 7 , and drawing 9 is a top view after the escape of drawing 7) of the stent 41 of this invention. The stent 41 is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The component 42 constituted by connecting four abbreviation wave-like components 46 with the upper right, the lower right, the upper left, and the lower left focusing on Point O up and down The annular unit 44 is constituted by arranging more than one so that other components 42 may be connected up and down through the connection 43 constituted by connecting abbreviation bay 43B of a connection 43 with the upper right, the lower right, the upper left, and the lower left of abbreviation wave section 43C and the medial axis of the stent 41 may be surrounded. Said two or more annular units 44 are installed by the shaft orientations of the stent 41, and said annular unit 44 comrades are connected by at least one or more connection sections 45 constituted by connecting abbreviation bay 45B with the upper right, the lower right, the upper left, and the lower left of abbreviation wave section 45C.

[0014] Flexibility at the time of the delivery of the stent can be improved by forming said connection section 45 as mentioned above. Said abbreviation wave-like component 46 is formed in the vertical symmetry to the center line C2 of bilateral symmetry and the stent shaft orientations of a component 42 to the stent radial center line C1 of a component 42. The connection 43 installed abbreviation bay 43B in the lower left and the direction of the lower right at the right-and-left both sides of downward flection 43A of abbreviation wave section 43C, installed abbreviation bay 43B in the upper left and the direction of the upper right at the right-and-left both sides of the upper limit of

abbreviation wave section 43C, and has connected each abbreviation bay 43B to abbreviation bay 46B of a component 46. Moreover, the connection section 45 installed abbreviation bay 45B in the lower left and the direction of the lower right at the right-and-left both sides of downward flexion 45A of abbreviation wave section 45C, installed abbreviation bay 45B in the upper left and the direction of the upper right at the right-and-left both sides of the upper limit of abbreviation wave section 45C, and has connected each abbreviation bay 45B to abbreviation bay 46B of a component 46. Bilateral symmetry and the connection section 45 are formed in bilateral symmetry for said connection 43 to the stent radial center line C4 of the connection section 45 to the stent radial center line C3 of a connection 43.

[0015] The abbreviation wave-like component 46 is formed in the space divided between Point O, said center line C1, and said center line C2. In case the abbreviation wave-like component 46 of the pair formed in bilateral symmetry to said center line C1 at the time of an escape is extended, when a connection 43 is extended to stent shaft orientations, contraction of the stent shaft orientations by escape can be prevented. Although a pressure required for a stent escape becomes high a little since the strut of a stent radius and shaft orientations has become two by connecting the component 46 and the connection section 45 of a pair which connected the connection 43 with the component 46 of the pair formed in bilateral symmetry to said center line C1, and were formed in the vertical symmetry to front 6 center line C2, the rate of recoiling can be reduced remarkably. Although it is hard in itself [of one unit / component 42], the fall of the flexibility of the whole stent can be suppressed by forming the magnitude of component 42 itself small so that it may be contained in the stent radial like drawing 7 at four pieces and eight stent shaft orientations.

[0016] Annular unit 44A of stent 41 both ends is formed so that abbreviation bay 46B of the component 46 of the upper and lower sides which constitute a component 42 may be connected by abbreviation wave section 46C and flexion 46D of abbreviation wave section 46C may be located in the edge of stent 41 shaft orientations. Considering workability and the engine performance, the radial number of arrangement of a component 46 has 16 good pieces from eight pieces in the stent whose path after an escape eight or more pieces are desirable in radial, for example, is 4.0mm in the stent 3.0mm or more as a path after an escape. In shaft orientations, it is good in the stent with a die length of 15mm for 20 pieces to arrange 40 pieces from 20 pieces in the stent which is 30mm preferably from ten pieces.

[0017] Drawing 10 is the top view (drawing 11 is the detail drawing of the component of drawing 10 , and drawing 12 is a top view after the escape of drawing 10) of the stent 61 of this invention. The stent 61 is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. Other components 62 are connected up and down through the connection 63 of the component 62 constituted by connecting four abbreviation wave-like components 66 with the upper right, the lower right, the upper left, and the lower left focusing on Point O which consists of abbreviation bay for two 63A up and down. The annular unit 64 is constituted by arranging more than one so that the medial axis of the stent 61 may be surrounded. Said two or more annular units 64 are installed by the shaft orientations of the stent 61, and said annular unit 64 comrades are connected by the connection section 65 which at least one place becomes from abbreviation bay 65B and flexion 65A.

[0018] Said abbreviation wave-like component 66 is formed in the vertical symmetry to the center line C2 of bilateral symmetry and the stent die-length direction of a component 62 to the stent radial center line C1 of a component 62. Said connection section 65 is constituted by connecting other flexion 65A and abbreviation bay 65B to the both sides of central flexion 65A through abbreviation bay 65B, respectively, and the edge of other abbreviation bay 65B is connected with said connection 63. Said connection section 65 is formed in bilateral symmetry to the stent radial center line C3 of the connection section 65. By arranging more than one so that other component 62A may be connected to the both ends of the shaft orientations of the stent 61 for component 62A constituted by [of flexion 66C] connecting abbreviation wave-like component 66B up and down through connection 63B up and down and the medial axis of the stent 61 may be surrounded, annular unit 64A was constituted and annular unit 64A is connected to the annular unit 64 through the connection section 65.

[0019] Bay 65B of the connection section 65 is connected with said connection 63B. As for the component 66 of the pair formed in bilateral symmetry to said center line C1, the section is connected through flexion 66A the bottom (above), as for the component 66 of a pair with which it connected through the connection 69 and the section was formed in the vertical symmetry to said center line C2 the top (below). Said component 66 by which abbreviation bay 65B of said connection section 65 is connected near the middle of abbreviation bay 63A (abbreviation bay 63B) of a connection 63 is formed in the space divided between Point O, said center line C1, and a center line C2. Since said connection section 65 forms width of face smaller than a connection 63 and a component 66, it is supple and makes insertion in the blood vessel of the stent easy. Moreover, since said connection section 65 forms loose flexion 65A in the both sides of central flexion 65A and forms abbreviation bay 65B in stent shaft orientations at these, it can prevent FO shortening at the time of a stent escape.

[0020] Since the stent 61 of this invention opened moderate spacing in stent shaft orientations for flexion 65A of the curvilinear section C of a component 66, and the connection section 65 like drawing 11 and has arranged it to the single tier, in case clipping of it is carried out to balun, it does not lap. Moreover, the stent 61 arranges the component 62 which consists of four components 66 like drawing 10 to stent shaft orientations at a single tier, and since it forms the size of a component 66 more thickly than the connection section 65, it can strengthen stent radial radiation bearing capacity.

[0021] Considering workability and the engine performance, the radial number of arrangement of a component 62 has eight good pieces from four pieces in the stent whose path after an escape four or more pieces are desirable in radial, for example, is 3.0mm in the stent 2.5mm or more as a path after an escape. In shaft orientations, it is good in the stent with a die length of 15mm for 12 pieces to arrange 16 pieces from eight pieces in the stent which is 20mm preferably from six pieces.

[0022] Drawing 13 is the top view (drawing 14 is the detail drawing of the component of drawing 13 , and drawing 15 is a top view after the escape of drawing 13) of the stent 81 of this invention. The stent 81 is formed in an abbreviation tubular object, and can be elongated from the interior of a tubular object to radial. The annular unit 84 is constituted by [of the component 86 of the letter of the abbreviation for S characters which has two or more flexion 86A] arranging more than one so that said other components 86 may be connected up and down through a connection 83 and the medial axis of the stent 81 may be surrounded. Said two or more annular units 84 are installed by the shaft orientations of the stent 81, and, as for said annular unit 84 comrades, at least one place is connected by the curve-like connection section 85.

[0023] Flexibility can be given while raising the rate of an escape by forming a component 86 in the shape of abbreviation for S characters. A radial force can be raised by furthermore connecting component 86 comrades by the connection 83. Said connection section 85 sets the tooth space S for every piece to the stent radial, and is formed in it. For this reason, since a moderate tooth space is made between large loop-formation section 86E of the component 86 which adjoins stent shaft orientations, and minor loop section 86D, the lap part at the time of clipping to balun can be prevented from coming out. Moreover, the damage on in the blood vessel by the flare phenomenon at the time of moving the inside of a blood vessel in a zigzag direction can be controlled as much as possible. Said component 86 is constituted by connecting large loop-formation section 86E with minor loop section 86D which consists of flexion 86A and curvilinear section 86B through central curvilinear section 86B. The end of said connection section 85 is connected to the edge of curvilinear section 86B of minor loop section 86D of a component 86, and the end of another side of the connection section 85 is connected to curvilinear section 86B of large loop-formation section 86E of a component 86.

[0024] The component 96 of the letter of the abbreviation for S characters which has short curvilinear section 96C was connected with the

both ends of the shaft orientations of the stent 81 up and down through the connection 93, by arranging more than one so that the medial axis of the stent 81 may be surrounded, annular unit 84A was constituted and annular unit 84A is connected to the annular unit 84 through the connection section 85. Said component 96 is constituted by connecting abbreviation wave section 96D which consists of large loop-formation section 96E and flection 96A which consist of flection 96A and curvilinear section 96B, and short curvilinear section 96C through central curvilinear section 96B. Large loop-formation section 96E of said component 96 is arranged abbreviation wave section 96D and by turns radial [of the stent], and it is arranged so that flection 96A of large loop-formation section 96E may be located in the both ends of the shaft orientations of the stent. For this reason, said flare phenomenon can be controlled as much as possible.

[0025] Drawing 16 is the top view (drawing 17 is a top view after the escape of drawing 16) of stent 81A of the example of others of the stent 81 of drawing 13 . The tooth space S for every piece is set to radial [of the stent], and the connection 83 of said component 86 is formed. For this reason, stent 81A can raise the rate of an escape, and can extend it to homogeneity more. Furthermore the flexibility at the time of a delivery also improves, and the rate of recoiling also decreases extremely.

[0026] Considering workability and the engine performance, the radial number of arrangement of a component 86 has six good pieces from three pieces in the stent whose path after an escape four or more pieces are desirable in radial, for example, is 4.0mm in the stent 3.0mm or more as a path after an escape. In shaft orientations, it is good in the stent with a die length of 15mm for 20 pieces to arrange 40 pieces from 24 pieces in the stent which is 30mm preferably from 12 pieces.

[0027] The stent 1, 21, 41, 61, 81, and 81A of this invention is formed by a laser process etc. from the metallic pipe which consists of shape memory alloys, such as stainless steel, such as SUS316L, a Ti Ni alloy, and a Cu-aluminum-Mn alloy, a titanium alloy, a tungsten, etc. Moreover, it is also good for the stent formed from these metals to make antithrombotic drug agents, such as physiological active substances, such as polymeric materials, such as urethane, and heparin, urokinase, and argatroban, cover.

[0028] [Function and Effect of the Invention] The stent 1 can suppress the damage on in the blood vessel by the flare phenomenon at the time of moving the inside of ** blood vessel in a zigzag direction as much as possible.

** FO shortening at the time of an escape can be prevented.

** The flexibility at the time of extending to the shaft orientations of the stent is securable by forming the thickness of a flection 8 more thinly than other configuration members of the stent 1.

** The resistance in the case of clipping is mitigable on balun.

The stent 21 laps at the time of clipping to ** balun, and a part can be prevented from the ability doing.

** The force in which it is equal to compression from radial [of the stent] can be strengthened.

** Excel in the flexibility at the time of the delivery to a blood vessel.

The stent 41 can improve flexibility at the time of the delivery of ** stent.

** Contraction of the stent shaft orientations by escape can be prevented.

** The rate of recoiling can be reduced remarkably.

The stent 61 has ** flexibility and makes insertion in the blood vessel of the stent easy.

** FO shortening at the time of a stent escape can be prevented.

** In case clipping is carried out to balun, don't lap.

** Stent radial radiation bearing capacity can be strengthened.

The stent 81 can give flexibility while raising the rate of ** escape.

** A radial force can be raised.

** The lap part at the time of clipping to balun can be prevented from coming out.

** The damage on in the blood vessel by the flare phenomenon at the time of moving the inside of a blood vessel in a zigzag direction can be controlled as much as possible.

Stent 81A can raise the rate of an escape, and can extend it to homogeneity more. Furthermore the flexibility at the time of a delivery also improves, and the rate of recoiling also decreases extremely.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] The top view of the stent 1 of this invention
- [Drawing 2] Detail drawing of the component of drawing 1
- [Drawing 3] The top view after the escape of drawing 1
- [Drawing 4] The top view of the stent 21 of this invention
- [Drawing 5] Detail drawing of the component of drawing 4
- [Drawing 6] The top view after the escape of drawing 4
- [Drawing 7] The top view of the stent 41 of this invention
- [Drawing 8] Detail drawing of the component of drawing 7
- [Drawing 9] The top view after the escape of drawing 7
- [Drawing 10] The top view of the stent 61 of this invention
- [Drawing 11] Detail drawing of the component of drawing 10
- [Drawing 12] The top view after the escape of drawing 10
- [Drawing 13] The top view of the stent 81 of this invention
- [Drawing 14] Detail drawing of the component of drawing 13
- [Drawing 15] The top view after the escape of drawing 13
- [Drawing 16] The top view of stent 81A of the example of others of the stent 81 of drawing 13
- [Drawing 17] The top view after the escape of drawing 13
- [Drawing 18] The top view of the conventional stent
- [Drawing 19] The top view of the conventional stent
- [Drawing 20] The top view of the conventional stent
- [Drawing 21] The top view of the conventional stent

[Description of Notations]

- 1 Stent
- 2 Component
- 3 Connection
- 4 Annular Unit
- 5 Connection Section
- 6 Abbreviation Wave-like Component
- 6A The curved abbreviation wave-like component
- 7 Abbreviation Bay
- 7L A long abbreviation bay
- 7S Short abbreviation bay
- 8 Flection
- 8U A upward flection
- 8L A downward flection
- 9 Connection
- C1 Center line of the stent shaft orientations of a component 2
- C2 Stent radial center line of a component 2
- 21 Stent
- 22 Component
- 23 Connection
- 24 Annular Unit
- 24A Annular unit
- 25 Connection Section
- 25A The flection of the connection section 25
- 26 Curve-like Component
- 26A The flection of a component 26
- 27 Abbreviation Bay
- 27L A long abbreviation bay
- 27S Short abbreviation bay
- 28 Flection
- 28R A rightward flection
- 28L A leftward flection
- 29 Connection
- 35 Connection Section
- 36 Curvilinear Section
- 37 Abbreviation Bay
- 41 Stent

42 Component
43 Connection
43A The flection of a connection 43
43B The abbreviation bay of a connection 43
43C The abbreviation wave section of a connection 43
44 Annular Unit
45 Connection Section
45A The flection of the connection section 45
45B The abbreviation bay of the connection section 45
45C The abbreviation wave section of the connection section 45
46 Abbreviation Wave-like Component
46A The flection of the abbreviation wave-like component 46
46B The abbreviation bay of the abbreviation wave-like component 46
46C Abbreviation wave section
46D The flection of abbreviation wave section 46C
C1 (stent radial of a component 42) Center line
C2 (the stent die-length direction of a component 42) Center line
C3 (stent radial of a connection 43) Center line
C4 (stent radial of the connection section 45) Center line
61 Stent
62 62A Component
63 63B Connection
63A The abbreviation bay of a connection 63
64 Annular Unit
65 Connection Section
65A The flection of the connection section 65
65B The abbreviation bay of the connection section 65
66 66B Abbreviation wave-like component
66A The flection of an abbreviation wave-like component
66C The flection of an abbreviation wave-like component
C1 (stent radial of a component 62) Center line
C2 (stent shaft orientations of a component 62) Center line
C3 (stent radial of the connection section 65) Center line
81 81A Stent
83 93 Connection
84 84A Annular unit
85 Connection Section
85A The flection of the connection section 85
86 96 Component of the letter of the abbreviation for S characters
86A, 96A Flection of the components 86 and 96 of the letter of the abbreviation for S characters
86B, 96B The curvilinear section of the components 86 and 96 of the letter of the abbreviation for S characters
86D The minor loop section of the component 86 of the letter of the abbreviation for S characters
86E The large loop-formation section of the component 86 of the letter of the abbreviation for S characters
96C The short curvilinear section of the component 96 of the letter of the abbreviation for S characters
96D The abbreviation wave section of the component 96 of the letter of the abbreviation for S characters
96E The large loop-formation section of the component 96 of the letter of the abbreviation for S characters

[Translation done.]

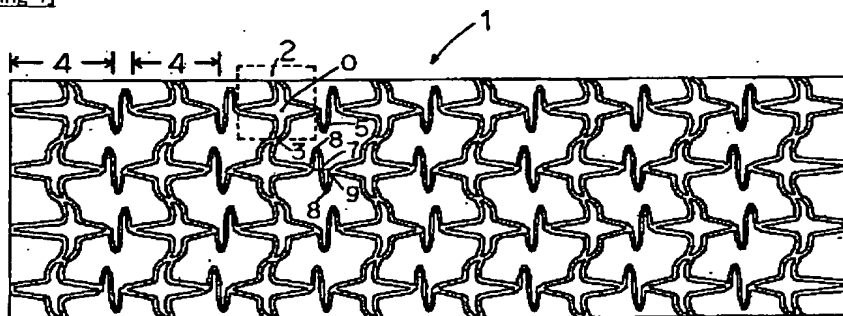
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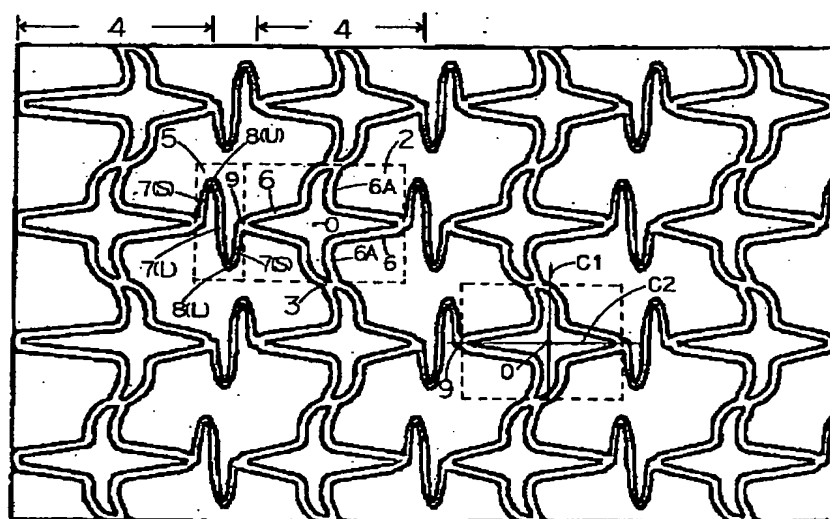
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DRAWINGS

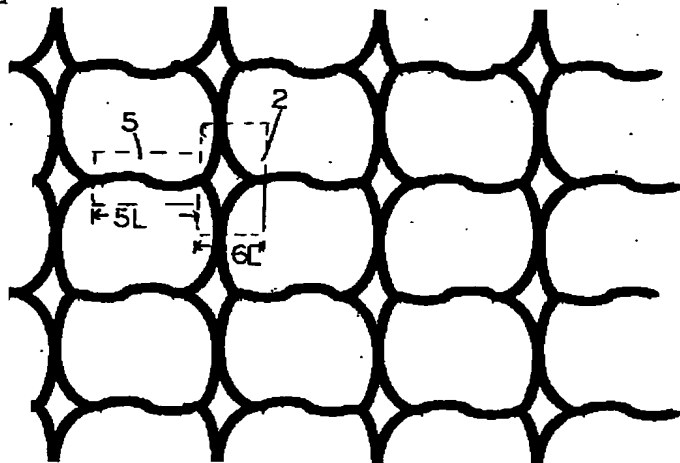
[Drawing 1]



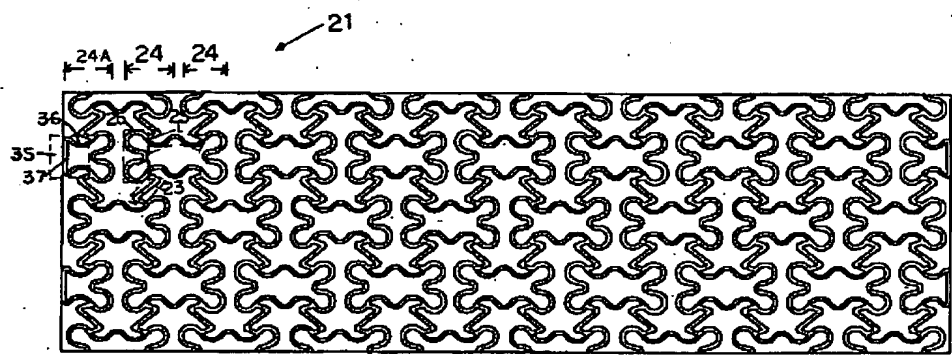
[Drawing 2]



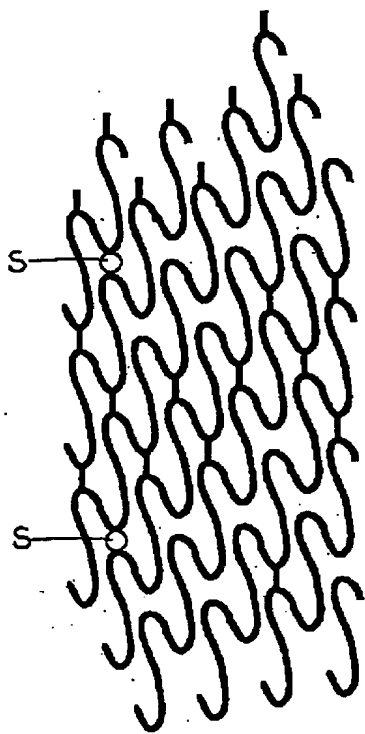
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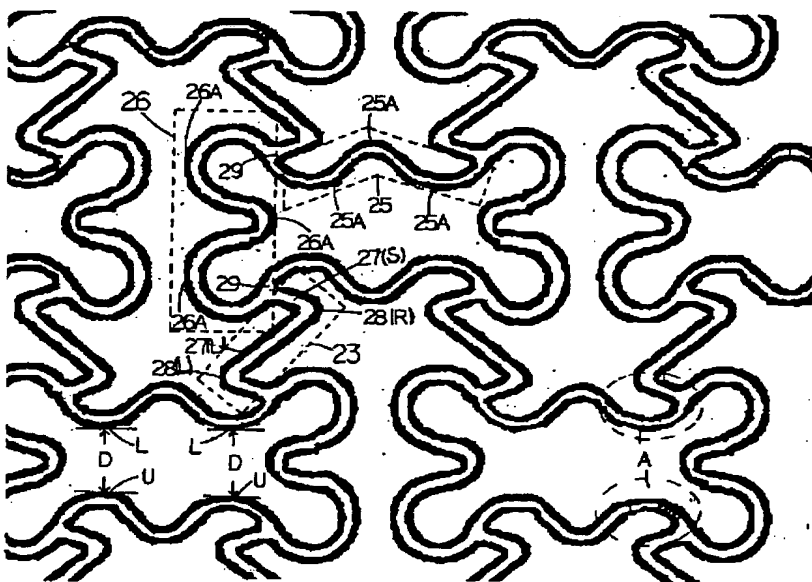
[Drawing 4]



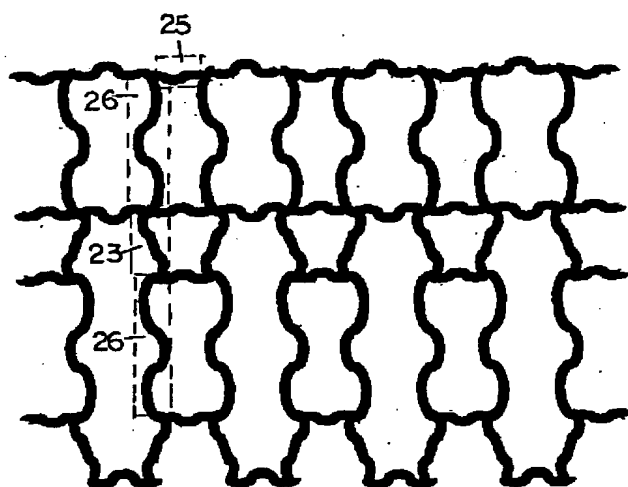
[Drawing 17]



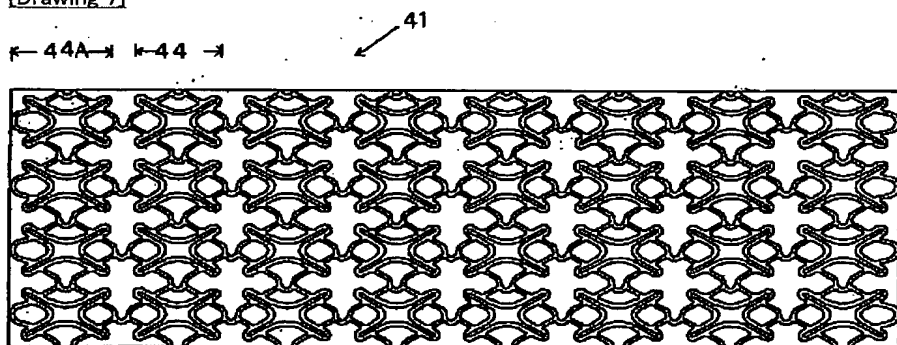
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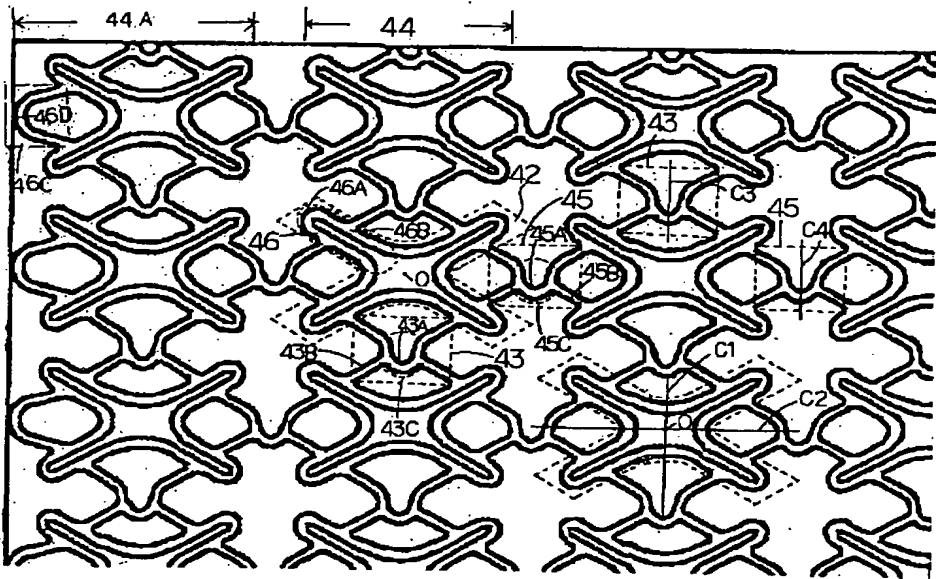
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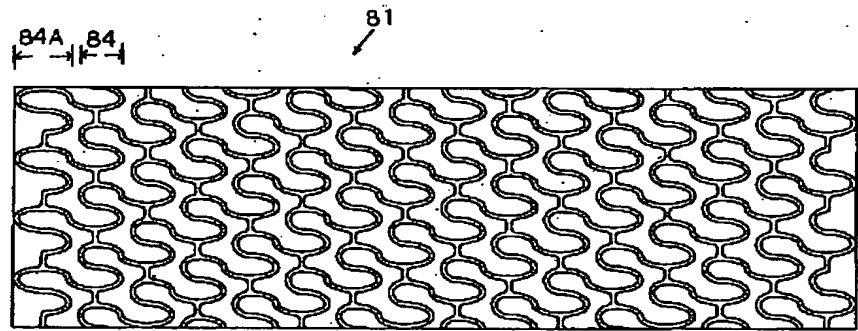
[Drawing 7]



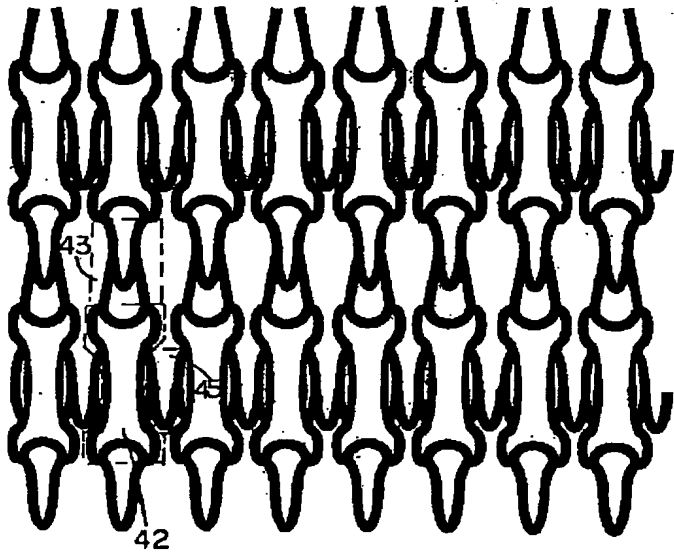
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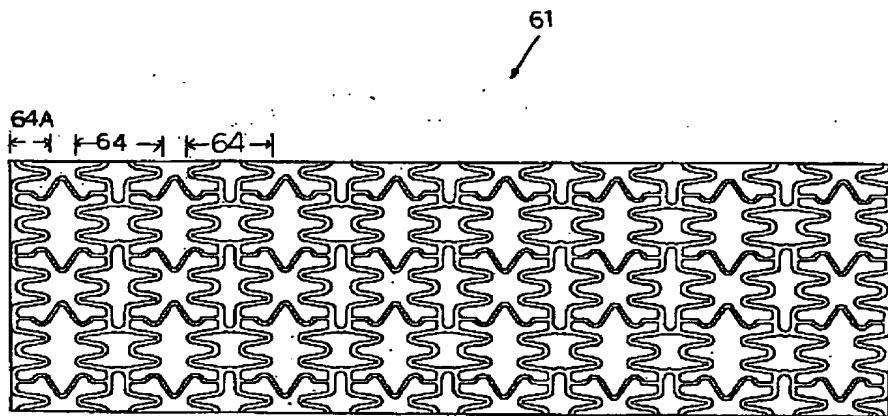
[Drawing 13]



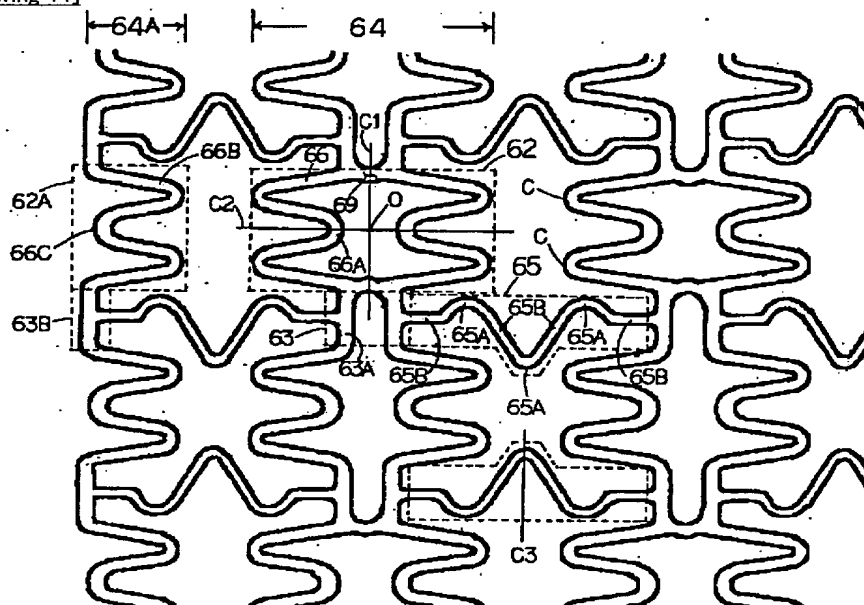
[Drawing 9]



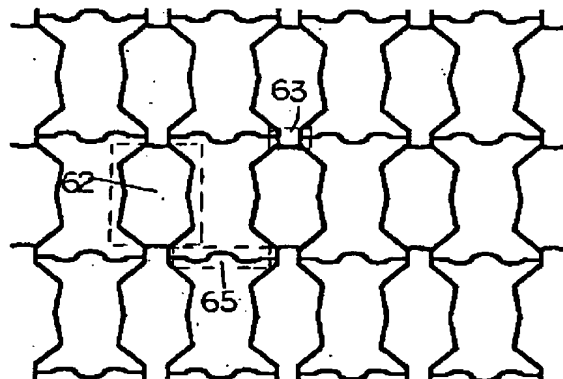
[Drawing 10]



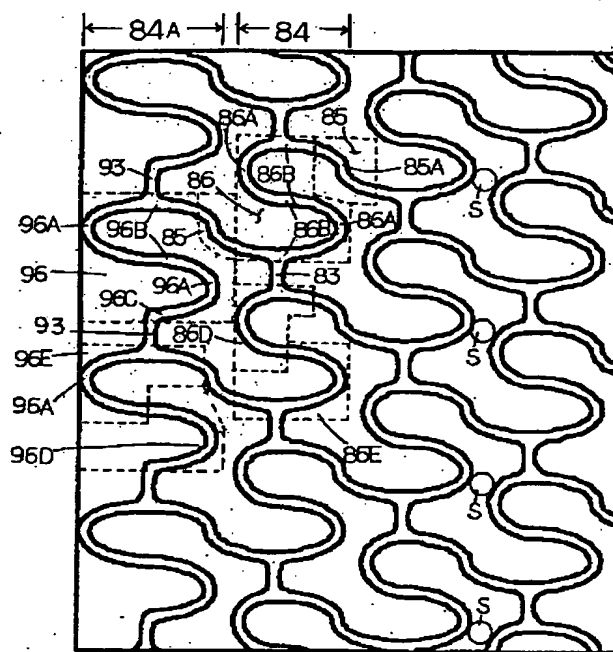
[Drawing 11]



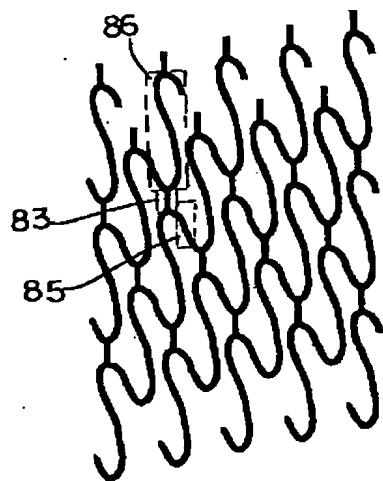
[Drawing 12]



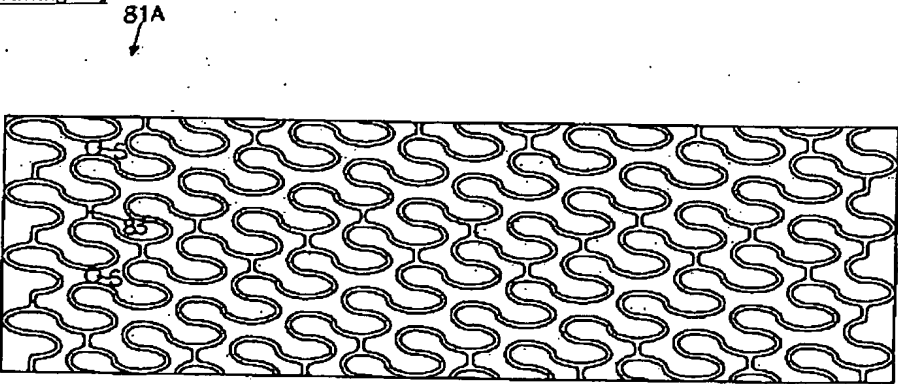
[Drawing 14]



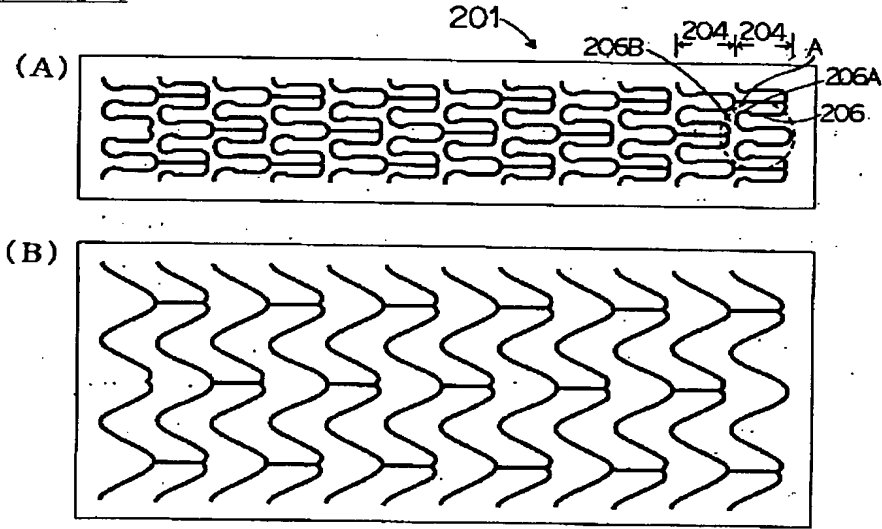
[Drawing 15]



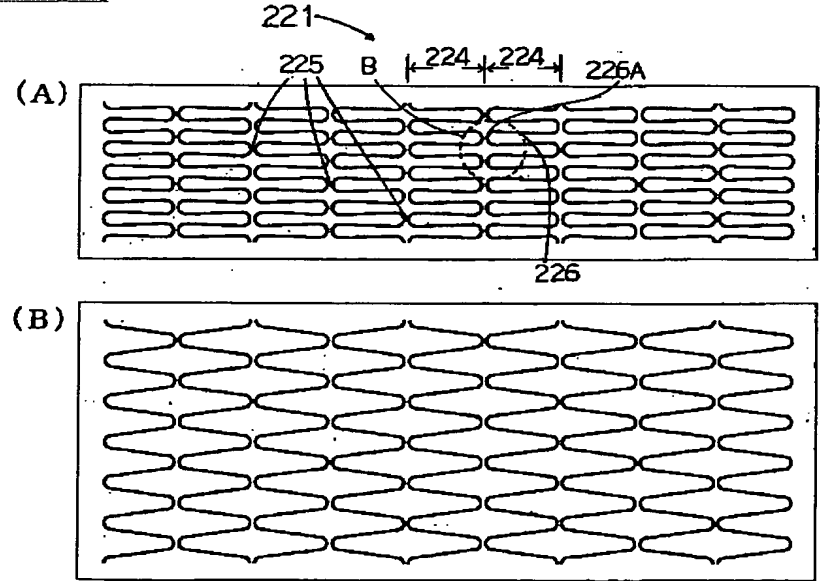
[Drawing 16]



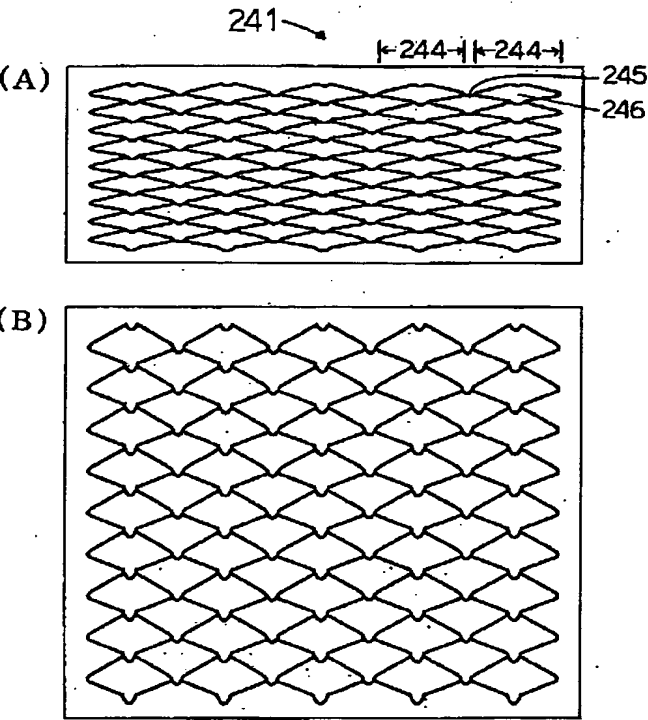
[Drawing 18]



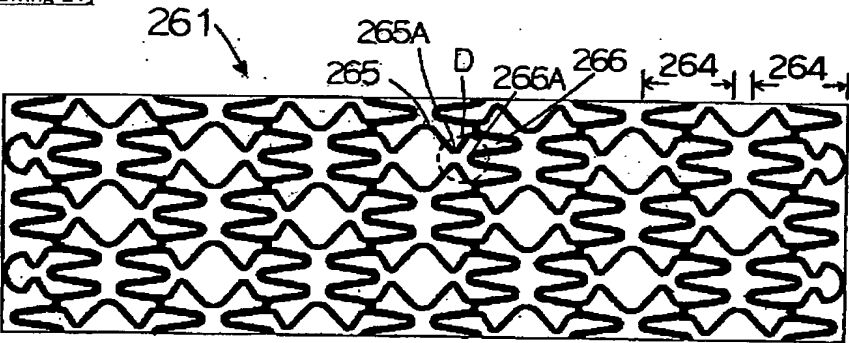
[Drawing 19]



[Drawing 20]



[Drawing 21]



[Translation done.]

拒絶理由通知書
 Official Action

mailing date: June 26, 2007



特許出願の番号	特願2002-286647	
起案日	平成19年 6月19日	
特許庁審査官	佐藤 智弥	3735 3E00
特許出願人代理人	向山 正一 様	
適用条文	第29条第2項	

この出願は、次の理由によって拒絶をすべきものである。これについて意見があれば、この通知書の発送の日から60日以内に意見書を提出して下さい。

理 由

この出願の下記の請求項に係る発明は、その出願前に日本国内又は外国において、頒布された下記の刊行物に記載された発明又は電気通信回線を通じて公衆に利用可能となった発明に基いて、その出願前にその発明の属する技術の分野における通常の知識を有する者が容易に発明をすることができたものであるから、特許法第29条第2項の規定により特許を受けることができない。

記 (引用文献等については引用文献等一覧参照)

- ・請求項1～13
- ・引用文献等1、2
- ・備考

本願請求項1に係る発明は、各環状ユニットの端部がジグザグ状に突出するとともに、前記各環状ユニットの接続部がステントの中心軸に対してほぼ平行となっている点で、引用文献1に記載された発明と異なる。

一方、引用文献2には、各環状ユニットの端部がジグザグ状に突出しているステントが記載されている（例えば、Fig. 3及び4参照）。

そして、接続部をステントの中心軸に対してほぼ平行とすることは、環状ユニットの形状等を考慮することにより、各環状ユニットを接続し得る範囲において当業者が適宜なし得た設計変更に過ぎず、接続部をステントの中心軸に対してほぼ平行とするに当たり格別な技術的支障があるとも言えない。

引 用 文 献 等 一 覧

1. 特開平09-299486号公報
2. 欧州特許出願公開第1070513号明細書

先行技術文献調査結果の記録

- ・調査した分野 IPC A61F2/82~2/84
- ・先行技術文献 特開平06-292730号公報
特開2001-161827号公報
特開2002-052086号公報
米国特許第5968093号明細書
米国特許第6022371号明細書

この先行技術文献調査結果の記録は、拒絶理由を構成するものではない。

この拒絶理由通知の内容に関するお問い合わせがございましたら下記までご連絡下さい。

特許審査第二部 福祉・サービス機器 佐藤 智弥
TEL. 03 (3581) 1101 (代表) 内線3344
FAX. 03 (3501) 0672